Using complementation and resequencing to minimize transitions

Murgai, R. Fujita, M. Oliveria, A.
Fujitsu Labs. of America Inc., USA

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Abstract
In (Murgai et al., 1997) the following problem was addressed: given a set of **data** words or messages to be transmitted over a **bus** such that the sequence (order) in which they are transmitted is irrelevant, determine the optimum sequence that minimizes the total number of transitions on the bus. Stan and Burleson (1994) presented the **bus**-invert method as a means of encoding words for reducing I/O power, in which a word may be inverted and then transmitted if doing so reduces the number of transitions. In this paper, we combine the two paradigms into one-that of sequencing words under the **bus**-invert scheme for the minimum transitions, i.e., words can be **complemented**, reordered and then transmitted. We prove that this problem DOPI-**Data** Ordering Problem with Inversion-is NP-complete. We present a polynomial-time approximation algorithm to solve DOPI that comes within a factor of 1.5 from the optimum. Experimental results show that, on average, the solutions generated by our algorithm were within 4.4% of the optimum, and that resequencing along with complementation leads to 34.4% reduction in switching activity.

Index Terms
Inspec
Controlled Indexing
computational complexity graph theory minimisation scheduling switching theory system **buses**

Non-controlled Indexing
DOPI **Data** Ordering Problem with Inversion NP-complete **bus**-invert method complementation encoding optimum sequence polynomial-time approximation algorithm resequencing system **bus** transition minimization
Author Keywords
Not Available

References

No references available on IEEE Xplore.

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Terms	Documents
(327/518 |370/464 |370/476 |710/305 |710/100 |710/34 |710/65 |712/220 |713/502 |365/49 |365/63 |365/190 |365/233.5 |365/205 |326/35 |326/86).ccls.	13372

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END OF SEARCH HISTORY

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L4	l1 and L3	143	L4
L3	L2 and (threshold or limit)	3619	L3
L2	count$3 near10 data near10 bus	6764	L2
L1	710/305,100,34,65;365/49,63,190,233.5,205;713/502;327/518;326/35,86;370/464,476;712/220.ccls.	13372	L1

END OF SEARCH HISTORY

Refine Search

Search Results -

Terms	Documents
L1 and L3	2

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Search: L4

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L3	complementing same data same bus same (threshold or limit)	5	L3
L2	complementing near10 data near10 bus near10 (threshold or limit)	1	L2
L1	count$3 near10 data near10 bus	6764	L1

END OF SEARCH HISTORY

Refine Search

Search Results -

Terms	Documents
L1 and L3	0

Database:
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Search: L5

Refine Search

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Search History

DATE: Thursday, November 17, 2005 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L5	l1 and L3	0	L5
DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
L4	l1 and L3	2	L4
L3	complementing same data same bus same (threshold or limit)	5	L3
L2	complementing near10 data near10 bus near10 (threshold or limit)	1	L2
L1	count$3 near10 data near10 bus	6764	L1

END OF SEARCH HISTORY

Refine Search

Search Results -

Terms	Documents
L1 and L6	31

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Search: L7

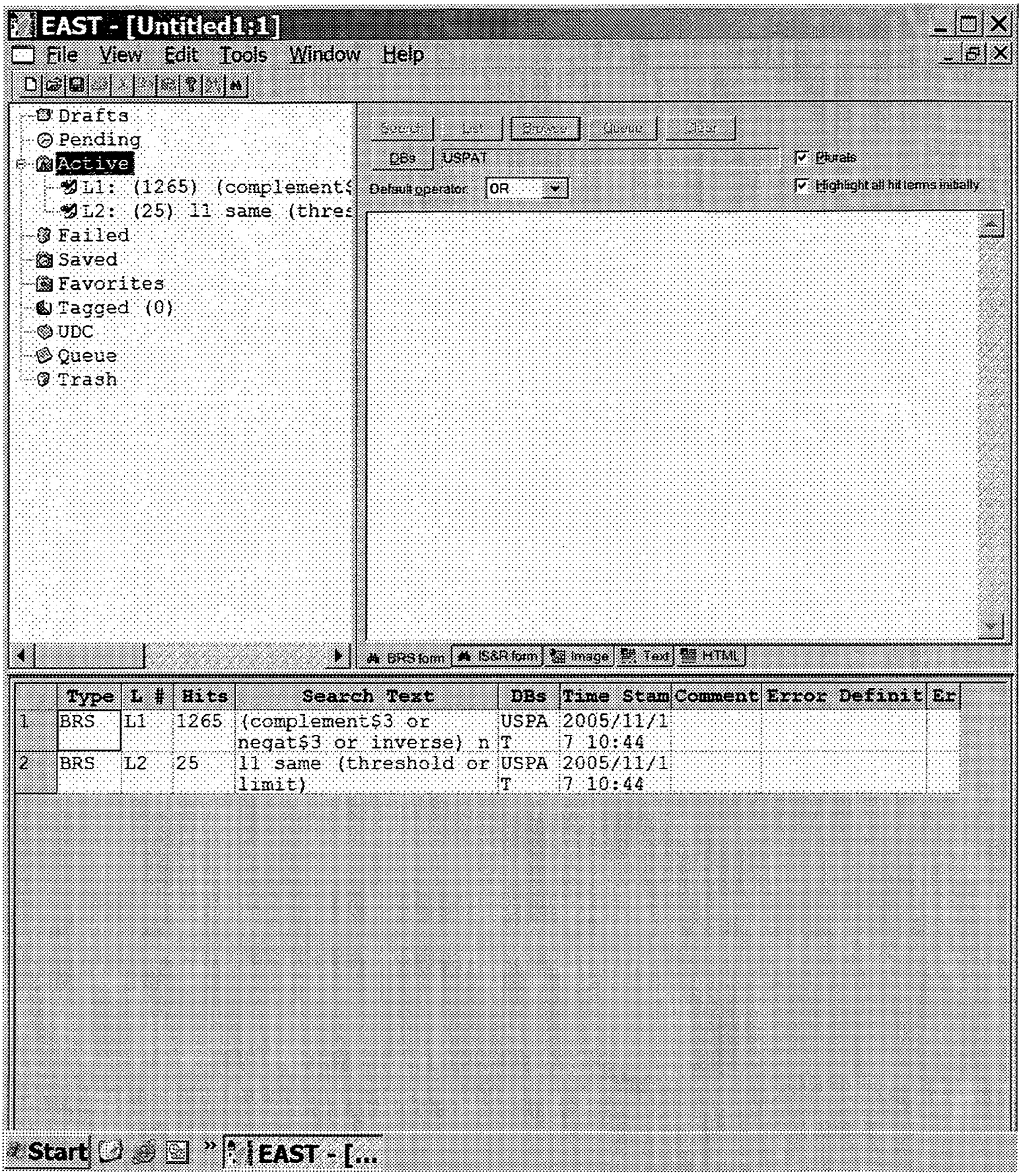
Refine Search | Recall Text | Clear | Interrupt

Search History

DATE: Thursday, November 17, 2005 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
L7	l1 and L6	31	L7
L6	complementing same data same bus	200	L6
DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L5	l1 and L3	0	L5
DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
L4	l1 and L3	2	L4
L3	complementing same data same bus same (threshold or limit)	5	L3
L2	complementing near10 data near10 bus near10 (threshold or limit)	1	L2
L1	count$3 near10 data near10 bus	6764	L1

END OF SEARCH HISTORY


EAST - [Untitled1:1]
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L1: (1265) (complement$
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2 BRS L2 25 l1 same (threshold or limit) USPAT 2005/11/17 10:44
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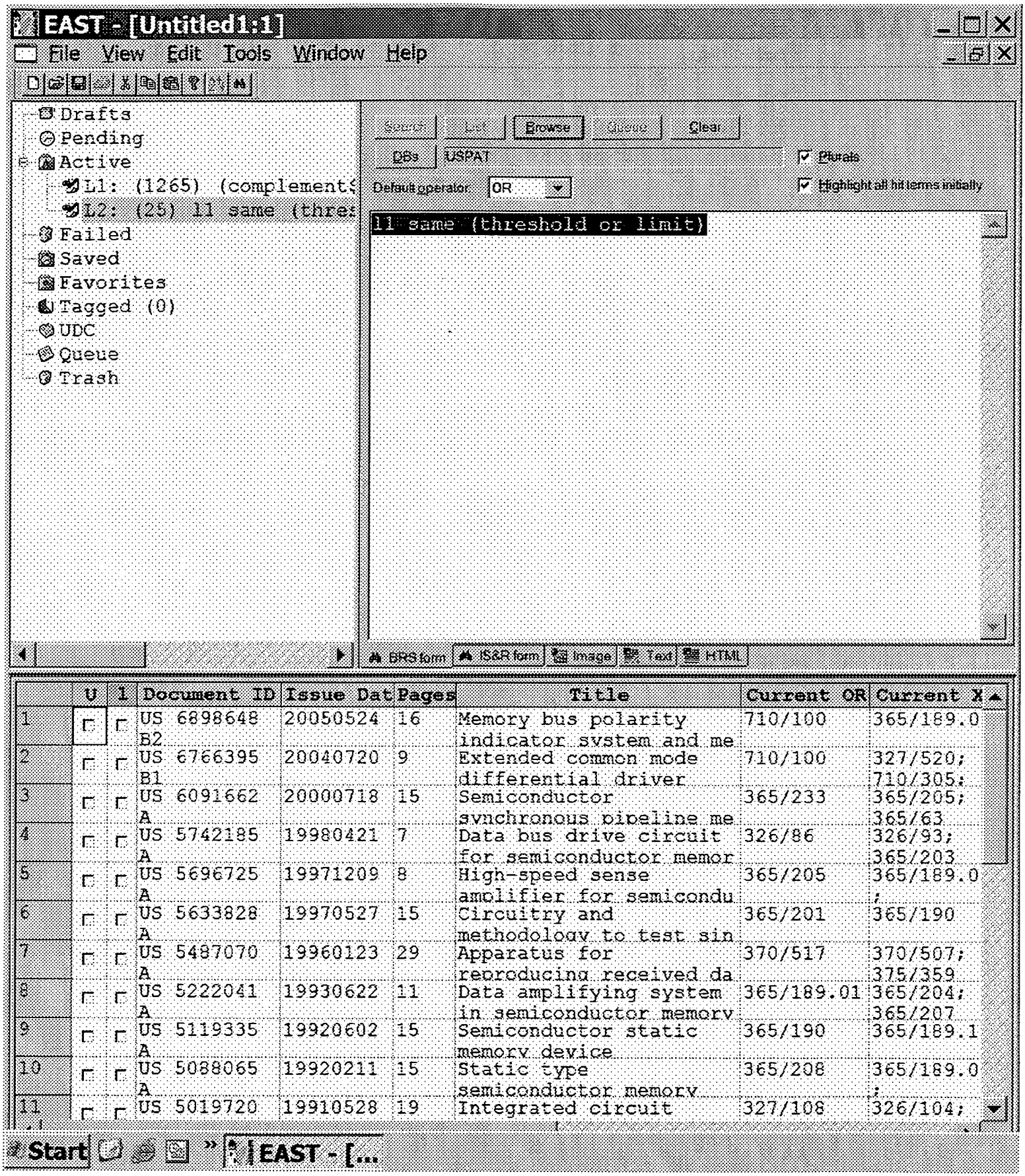
EAST - [Untitled1:1]
File View Edit Tools Window Help
Drafts
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l1 same (threshold or limit)
BRS form
IS&R form
Image
Text
HTML
U
1
Document ID
Issue Dat
Pages
Title
Current OR
Current X
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2 US 6766395 B1 20040720 9 Extended common mode differential driver 710/100 327/520; 710/305;
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11 US 5019720 19910528 19 Integrated circuit 327/108 326/104;
Start
EAST - [...

Results for "((complementing<in>metadata) <and> (data<in>metadata))<and> (bus<i..."

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((complementing<in>metadata) <and> (data<in>metadata))<and> (bus<in>meta

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» Key

IEEE JNL	IEEE Journal or Magazine
IEE JNL	IEE Journal or Magazine
IEEE CNF	IEEE Conference Proceeding
IEE CNF	IEE Conference Proceeding
IEEE STD	IEEE Standard

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References

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